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ABSTRACT

ENLIST-Micros (ENcourage LIteracy in Science Teachers' uses of Microcomputers) develops state networks of science and mathematics teachers providing inservice education and support for the implementation of computers and technology in the classroom. In Alabama, the project operated from August 1990 through June 1994. Most inservice workshops were held at Auburn University. Participants included 50 urban, 22 suburban, and 31 rural teachers from schools in Montgomery and the Auburn area. The first 2 years of the project focused on training the teacher participants to use microcomputers and to share their knowledge with other teachers. In the third and fourth year, veteran teachers provided individual training and inservice workshops to other teachers. Teacher reactions were overwhelmingly positive and frequently focused on the collegiality and mutual support experienced in the project. After the first year, teachers took the responsibility for making programming choices and carrying out monthly seminars, indicating their capability of continuing the network beyond the project period. For rural teachers in particular, the project offered fellowship, shared problem solving, and relief from professional isolation. This report includes characteristics of participating teachers and sample journal entries by rural teachers in the first project year. (SV)

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ENLIST-Micros Teacher Network for Rural Math & Science Teachers

Paper presented at the 86th annual meeting of the

National Rural Education Association

Tuscaloosa, Alabama

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I. Background

ENLIST-Micros is an acronym for ENcourage LIteracy in Science Teachers' uses of Microcomputers. This network of science and mathematics teachers provided four years of continuing education in ways to effectively implement computers and technology for classroom instruction. The origin for this national project began with a Biological Sciences Curriculum Study (BSCS) grant from the National Science Foundation to establish twelve centers around the country to promote the use of technology among science teachers. We received funds to become one of these national sites by operating a teacher network in Montgomery and East Central Alabama. Our project operated from August of 1990 through June, 1994 with funding support from BSCS, Dwight D. Eisenhower Mathematics and Science Education Program, Auburn University, and The East Alabama Regional Inservice Center. Local schools also provided funds for each teacher. This paper will describe the program we directed, its participating schools and teachers, and outcomes we observed.

II. The program

The duration of the project was a four-year period from the 1990-91 school year through the 1993-94 school year. Sixty-five schools and 103 teachers participated. The annual format consisted of a two-day workshop in mid-August and monthly, three-hour workshops throughout the school year. The principal of each school was required to approve an "action plan," delineating the expectations of the school for the project, and to provide each participating teacher with a microcomputer in his or her classroom. The ENLIST-Micros project, using Eisenhower funds from NSF, provided meals, lodging, and a stipend for the two-day workshops, $50 of software annually, and one day of release time annually for each participating teacher.

The first two years of the project focused on the training of the teachers, not only in the use of microcomputers, but also in the importance of and methods for sharing that knowledge with other teachers, especially in their own schools. During the third and fourth years, the emphasis was on training other teachers either through one-on-one contact or by conducting workshops and in-service programs. Also during the third and fourth years, the project was expanded from consisting of mainly science teachers to include mathematics teachers as well. In addition to helping the new teachers, the veteran teachers could choose to attend sessions on new, more advanced topics.

Each monthly workshop began with a time of informal sharing of successes and problems (and frequently solutions for those problems) encountered during the previous month. (Food helped "break the ice" and lower the inhibitions!) Writing monthly journal pages helped jog the memory, and provide some continuity. The journal pages also provided material for the quarterly newsletter that was distributed to all participants. After the period of journal writing and sharing, participants would go to one of up to three sessions which had been announced in a letter sent monthly to each participant. The letter, along with a phone call each month, helped encourage participation and added a "personal

touch" to the program. Most of the workshops were held at Auburn University, however many were held at participating schools. This gave the other teachers the opportunity to observe the facilities of their colleagues, and gain a better understanding of the unique aspects of their educational setting.

III. Teachers and school districts served

One hundred-three teachers in sixty-five schools have been active participants in this project. Table I describes the distribution of network participants by gender, race, grade level, school type, and primary subject taught. The forty-five schools in the Montgomery County School System are all urban, and almost three-fourths are elementary. The fourteen schools of the Auburn area are in rural and suburban school districts. Auburn and Montgomery are 55 miles apart, so programming for these two groups was carried out in separate locations. The Auburn group was made up of teachers who do not have a strong central office to provide regular inservice and support. Thus, they must rely on themselves and local resources such as the East Alabama Regional Inservice Center for help, including workshops, materials, and travel support.

IV. Sharing the cost of operating a teacher network

First-year support was provided from grants awarded by the Biological Sciences Curriculum Study ($10,000) and Dwight D. Eisenhower Funds for Mathematics and Science Education (Year #1 = $29,511; Year #2 = $25,844; Year #3= $37,025; Year #4 = $28,848). Our regional inservice center provided materials and travel support for teachers, along with help in purchasing software for participants, and administrative support in arranging regular workshops, software previewing, and school visits. The Auburn University Office of Extension provided 25% of the director's salary.

The Auburn area teachers formed a special interest group on writing mini-grants for external funding. Three teachers who wrote successful grant proposals during the 1990-91 academic year led this group, which met in conjunction with our August leadership workshop to present a special session on how to write and submit small grant proposals.

V. Outcomes

The reactions of the participants were overwhelmingly positive. The previous computer experience of the participants was varied. Some had never used a computer before and some had previous experience using computers. Benefits were reported by participants at both ends of that spectrum. "I have more self confidence now. I had taken some computer courses in college, however, I still did not have the confidence I needed until becoming a member of ENLIST-Micros," reported one member. Many indicated that collegiality was a highlight of the program that will continue, even after the structured project has ended. "Having peers to talk to as to how they got started and how they have used computers has strengthened my attitude toward computer usage. We can all benefit from peers sharing information and their support. I listen to my peers more quickly than

'instructors' and I now have many fellow teachers to call for information and support even after the program ends."

One session that was always well-received by the participants was software preview. With the overwhelming amount of software on the market, it can be difficult to determine whether a particular product would be effective in a certain setting. Being able to see it used, talk to someone who has used it, and use it oneself, can greatly enhance the selection process. One member commented, "I also liked getting to preview software as well as get input from others concerning software they had seen and/or purchased and how it was beneficial to them and their students. The fact that the inservice center on AU's campus was so helpful was also a nice touch." Some of the software to be previewed was provided by the East Alabama Regional Inservice Center, and some was brought by participants who had used it successfully in their classrooms.

One teacher, who reported "tremendous response from students," stated that "ENLIST-Micros serves as an instrument to rid teachers of that fear (of computers) and enable them to become better teachers as a result of using the computer." A comment that seems to summarize the program, from a participant is, "It's a congenial and non-threatening way to introduce computer use."

VI. First-year operation and adjustments

First year plans to introduce all participants to effective uses of computers for instruction were mostly accomplished. Second year goals dealt with increased leadership emphasis at the building level. Teachers began to take charge of their own destiny by forming committees to select and order software. Teachers identified special topics they would like to pursue in small groups, and selected leaders who took charge of arrangements for these special interest groups. It became clear that not all teachers were interested in MBL, video-disk technology, database operations, and other themes we addressed in monthly seminars during our first academic year. However, as each special interest group emerged, so too did the necessary teacher leadership for that group. This implies that teachers will be able to sustain this network beyond its final year of formal operation.

Both sub-centers established committees and formal means of ordering software and distributing it to participating ENLIST-Micros schools. The Montgomery school system has an internal mail system that delivers media materials to schools on a daily basis. Teachers have a check-out system to reserve software for specific dates and durations. Unspent funds from teacher released time in the first year were spent on software, which is available to all participating teachers.

To assure the effectiveness of our project, we designated review boards made up of teachers and principals from each of the sub-centers. Suggestions from these bodies were used to make improvements in the project's first two years of operation.

VII. Teachers' roles in operating the program

After the first year, we offered teachers more leadership in programming choices and responsibility for carrying out the monthly seminars. Montgomery continued to hold drop-in sessions with small groups of teachers. These were ad hoc meetings where teachers could bring any software or hardware problem and know that at least one staff member would be available to help answer questions and deal with the frustrations of computer uses in schools. The Montgomery staff took a courageous step in establishing these walk-in sessions, since planning was usually not possible, and each group of teachers came with several different types of software and sets of questions. These sessions were so successful that they continued.

Actual dates and topics for the monthly seminars were set by teachers when they met for a two-day training seminar before the school year began. We held at least one three-hour seminar per month, and required all teachers to attend at least five of these nine meetings. In fact, most teachers attended most of the seminars, with a few attending all nine. This is in spite of diverse topics, long driving distances, and occasional conflicts with personal and school duties. We were quite pleased with the outcomes of workshops and seminars. Teachers have the option of continuing this program beyond the funding period through the support of the Inservice Center.

VIII. Advantages of this network for rural education

The nature of rural environments makes it important that interventions foster a sense of belonging among participants. This means that the schedule should provide for fellowship and problem solving at each meeting. We found that teachers wanted each other's company more than they wanted us or the computers. Collegiality was our biggest selling point after the first few meetings. Teachers in most rural schools feel quite isolated from colleagues who share similar problems. They would drive many miles to share experiences and seek solutions together.

IX. Questions for implementors

1) How can this type of program serve diverse needs of teachers other than science and mathematics?

2) What sources of funding are available now to implement this type of network?

3) Are there other agencies besides universities and state departments of education that should work together in planning and executing this type of program?

4) Would schools and teachers in my area benefit from this type of service?

Table I

Participating Teachers

Alabama ENLIST-Micros Network

1990 - 1994

N = 103 teachers in 65 schools

Demographic Variable	Montgomery Area	Auburn Area	Total
Gender of teacher			
Male	6	14	20
Female	44	39	83
Race of teacher			
Black	20	15	35
White	30	38	68
Grade Level			
Elementary	25	15	40
Junior High School	19	12	31
High School	6	26	32
Type of School			
Urban	50	0	50
Suburban	0	22	22
Rural	0	31	31
Subject Area			
Math	10	22	32
Science	15	18	33
Both math & science	0	1	1
Other (elementary)	25	12	37

Sample Journal Entries from First Year (Auburn teachers)

Edited by Regina Carwile, Graduate Teaching Assistant

** Pam Pearson at **Five Points High School** used the software "Adding Sine Waves" to study wave interference. These are the results: "We began our study of wave properties yesterday by discussing wave parts and types. Today we reviewed terminology for about 15 minutes, then used a slinky to demonstrate each of the characteristics studied thus far, plus a few new ones. After demonstrating wave interference with the slinky, we moved to the computer room to use the program: ADDING SINE WAVES. Evaluation: I was really surprised! I didn't think my student would be very interested in this program, but I was wrong. We finished the lesson in about 15 minutes and had about 8 minutes left before going home, but all groups voluntarily continued to experiment with the data to make their own wave patterns, comparing them with other groups and asking me to look, too. NOT ONE STUDENT ASKED FOR A *FREE TIME* DISK!! I will definitely use this one next year. Its educational value is excellent. This is the best way I know to teach wave interference."
Also, the OFFICIAL WORD is: Approval from the State Department for the purchase of a Macintosh computer and laser disc player for the science department at **Five Points High School** using Eisenhower funds. Congratulations!

** In January, **Tallassee High School** received an IBM 25 with the Compton's Encyclopedia for use in the Media Center. Students can now use the computer to research topics in almost any field. Harriet Landrum has obtained a RF modulator to connect her computer to a large screen television. Now the entire classroom can view images. Good work, Bob and Harriet!

** CONGRATULATIONS!!!! The Alabama Academy of Science awarded Randy Howell of **Reeltown High School** a mini-grant for $500.00 on his proposal to incorporate the computer as a tool in the physics laboratory. Randy plans to stimulate critical thinking through discovery learning, to provide an alternative method of explaining abstract concepts and problem solving strategies, and to generate enthusiasm toward science and technology. Way to go, Randy!

** Randy Howell and Truenetta Meadows have also used some of the public domain software by letting those students who finish their work play Energy Hangman and Energy Crossword. "The students seemed enthusiastic about playing these simple games on the computer." Many of the parents of students at **Reeltown School** have received student progress reports from Randy and Truenetta since they are using J&S Gradebook to record their grades.

** Enlist Micros teachers Barbara Williams, and Jesse Lockhart are busy at **Russell County High School**. " Our goal is to implement our knowledge of computers gained because of our involvement with a new dimension in the teaching arena, COMPUTERS IN THE SCIENCE CLASSROOM. We were honored to host our director, Dr. Bill Baird, and his project director, Phil Goulding, at our school. The agenda consisted of Dr. Baird teaching three lessons using *King's Rule*. Our students responded very well. During lunch with our principal and guests, we were able to discuss our goals at Russell County High."

** One of our Fall 1990 seminars featured a collection of public domain software. Shortly afterwards, several Elementary teachers were shown how to implement the "Hang Man" software by reprogramming their own words and definitions. Among these teachers were Susan Truitt from **Dadeville Elementary** and this is what she found: "Last week I came back and worked on reprogramming my Hangman disk. I finally fixed it and now the kids can't keep their hands off of it. I have had an intern from Auburn this quarter so it has been very *hit and miss* as to the use of incorporating the computer *directly* into my teaching curriculum although it is in use in reading, language, and math."

** The **Wacoochee Junior High** Science Department was responsible for their PTA program on January 29th. They report: "Since the school is collecting Food World receipts for computers in the school, Nancy and I were asked to share some of what we have learned from participating in Enlist Micros. We decided to use King's Rule and set up a mock classroom situation similar to what was done at our summer meeting. All science teachers picked 2-3 students from each of their classes for our *classroom*. We hooked one computer to a color monitor for the PTA to view and went through several levels of the program. Our main purpose was to illustrate to parents and fellow teachers how effective ONE computer can be in a classroom (you don't necessarily need a computer lab!). Our point was well taken when after we completed the program and were answering questions, the students were still trying to form hypotheses and had to be asked to quiet down so the parents could ask questions! The

response from parents, teachers, and students was great! Several parents offered encouragement and help after the program.

** **PAM PEARSON from Five Points High School** wrote in her journal "taught Home Economics teacher to use Bankstreet Writer for word processing her research paper. She has become more interested in using computers in her classes and has borrowed some software from a friend to preview." Pam also used the computer in a Physics group activity." We performed two labs with the light probe and the science toolkit software in the dark of the book room. The first lab required students to take data and them graph the relationship between light intensity and distance. We used both a candle and a 25 watt bulb. The second activity required students to measure the intensity of light reflected off different colored and textured surfaces. Both labs were included in the teachers manual for Broderbund Science Toolkit Plus. The results were good. (We also crunched our wintergreen lifesavers while we were in the dark). Two of my senior high students used the Broderbund Science Toolkit to perform experiments with light and temperature for their science project. Since the program is so easy to use, they were able to set up the equipment by themselves and needed very little help from me."

** "The **Tallassee High School** ENLIST-Micros network is up and running. On Friday, November 16, 1990, Dr. Bill Baird and Regina Carwile together with Bob Hayes and Harriet Landrum presented an inservice workshop on computer software to Tallassee's elementary teachers. Ten teachers were presented with copies of all MECC software pertinent to science and mathematics instruction. The teachers also received copies of catalogues from a variety of software companies so they could order software. During the first hour, some of the software presented was: *Backyard Birds*, *Lunar Greenhouse*, other MECC titles, and *Muppet Learning Keys*. During the second hour, teachers and presenters convened in the computer room so we could individually work with the software. The workshop was a resounding success!!"

During December, Tallassee teachers visited Opelika High School to view their use of computers in an integrated system. In hopes of eventually gaining a networked system of computers Enlist-Micros teacher Bob Hayes and Principal Rob Johnson attended a three week course on computer networking offered by the Alabama Department of Industrial Training. The course met twice a week for three hours a night and included instruction on how to design networking systems such as INTERNET.

Harriet Landrum and Bob Hayes report on one of the computer software programs they purchased with their ENLIST-Micros funds. "DRUGS AND HEARTBEAT: EXPERIMENTS WITH A DAPHNIA has two programs. First, it is a lab experiment. It simulates the actual view through a microscope when various chemicals are put on a daphnia. Second, it shows that these drugs do have an effect on the daphnia. Students can count and chart the heartbeat for one minute as alcohol, caffeine, nicotine, valium, codeine, and cocaine are put on the daphnia. For other teachers who may be interested, this program is for an Apple computer and can be purchased for $29.95 from Cambridge Development Laboratory, Inc. "

** **CONGRATULATIONS CHARLOTTE NOLES AND SUSAN TRUITT from Dadeville Elementary School** for receiving word that an Apple computer has been ordered for their first grade. In their proposal for the Alabama Power Company Educational Grant, Susan and Charlotte expressed their desire to "rotate the use of the science laboratory, the Apple IIGS computer, and software during the academic year to supplement science instruction to approximately one hundred twenty-five students in self-contained classrooms." They have not heard from this grant yet, but they are on the right road to establishing the science laboratory they need for effective teaching. **MARGARET CALDWELL AND LINDA SCROGGINS from Dadeville High School** have already received computers through local industry.

** **Phil Hazelrig of Eufaula High School** shares the following events and thoughts in his journal: "I talked with the principal concerning our orientation. We discussed the possibility of getting a computer and projection device for the science department. The principal said I could have his old computer (IBM PC) and to find out what everything we had discussed would cost. I also wrote a grant proposal for GO-FOR-THE-GOLD award. I simply want to put the microcomputer to use in the science classroom. As you know, students get tired of the same old strategies no matter how often we vary them. The use of the microcomputer as an academic teaching strategy would be new to the students and to the science department. My principal has helped me acquire the necessary hardware to implement my project. I told the special education teacher in our school that I would try to work some this summer to see if some of our MECC software would be useful to them. Their main problem is not having any software for their kids.